Patient Safety in Surgery

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Background: Improving patient safety is an increasing priority for surgeons and hospitals since sentinel events can be catastrophic for patients, caregivers, and institutions. Patient safety initiatives aimed at creating a safe operating room (OR) culture are increasingly being adopted, but a reliable means of measuring their impact on front-line providers does not exist.

Methods: We developed a surgery-specific safety questionnaire (SAQ) and administered it to 2769 eligible caregivers at 60 hospitals. Survey questions included the appropriateness of handling medical errors, knowledge of reporting systems, and perceptions of safety in the operating room. MANOVA and ANOVA were performed to compare safety results by hospital and by an individual's position in the OR using a composite score. Multilevel confirmatory factor analysis was performed to validate the structure of the scale at the operating room level of analysis.

Results: The overall response rate was 77.1% (2135 of 2769), with a range of 57% to 100%. Factor analysis of the survey items demonstrated high face validity and internal consistency ($\alpha = 0.76$). The safety climate scale was robust and internally consistent overall and across positions. Scores varied widely by hospital [MANOVA omnibus $F (59, 1910) = 3.85$, $P < 0.001$], but not position [ANOVA $F (4, 1910) = 1.64$, $P = 0.16$], surgeon (mean = 73.91), technician (mean = 70.26), anesthesiologist (mean = 71.57), CRNA (mean = 71.03), and nurse (mean = 70.40). The percent of respondents reporting good safety climate in each hospital ranged from 16.3% to 100%.

Conclusions: Safety climate in surgical departments can be validly measured and varies widely among hospitals, providing the opportunity to benchmark performance. Scores on the SAQ can serve to evaluate interventions to improve patient safety.

(*Ann Surg* 2006;243: 628–635)

Hospitals are under increasing pressure to develop sound hospital systems to prevent sentinel events. The advancement of a culture promoting patient safety is a fundamental part of a systems approach to patient care and the administrative focus of many departments of surgery.[1] Recent attention to this topic stems from several high-profile medical errors and several Institute of Medicine reports which quantified the problem, created standardized definitions, and charged the healthcare community to develop improved hospital operating systems.[2,3] The promotion of patient safety has been further advanced by the recent malpractice crisis in surgery and the demonstrated vulnerability and devastation hospitals face after public exposure of a sentinel event. Compared with other hospital settings, errors in the operating room can be particularly catastrophic and, in some cases, can result in high-profile consequences for a surgeon and an institution. Wrong-site/wrong-procedure surgeries, retained sponges, unchecked blood transfusions, mismatched organ transplants, and overlooked allergies are all examples of potentially catastrophic events which, in certain circumstances, can be prevented by improved communication and safer hospital systems. In one study of all root cause analyses submitted to the Joint Commission on Accreditation of Healthcare Organizations (JCAHO), communication was identified as the most common root cause of sentinel events wrong-site surgeries.[4] As a result, creating a culture of safety is a high priority for surgeons and hospitals.

Several interventions to improve patient safety in surgery have been introduced, including additional checks to confirm procedures and new policies to govern the operating room. In addition, many hospitals are investing in safety training programs for their staff in an effort to improve the culture of safety in the operating rooms. Yet, while there are many new safety initiatives, there are few tools available to measure the actual effect of interventions on outcomes. This is a critical problem in validating patient safety improvement efforts. Furthermore, collecting data on medical errors in surgery is difficult because near misses are often unreported and sentinel events can be rare. Using a valid and reliable measurement instrument, culture data can serve as a benchmark for hospitals to gauge their performance in advancing the patient safety agenda.

Applying a fundamental axiom of business management, we maintain that accurate and scientific feedback from front-line personnel is a critical component of any successful intervention. Indeed, attitudes about culture among workers

have been associated with error reduction behaviors in aviation,[5] and with patient outcomes in intensive care units.[6–8] Based on this demonstrated association in the literature and our own clinical experience, we propose that perceptions of *how safe a workplace is,* as recognized by front-line providers, is a reliable and valid surrogate of adverse events. Indeed, it is perhaps the only surrogate we have in measuring safety risk. An "unsafe" operating room culture, as assessed by front-line providers, can in fact be an important risk factor for the occurrence of a sentinel event.

Recognizing the potential association between culture and outcomes, the JCAHO is proposing a requirement that all hospitals measure their culture beginning in 2007 (www.jcaho. org). Hospitals are encouraged to start measuring culture in the year prior to the new requirement. While there are many assessment surveys for quality of life and other aspects of well-being, there are no reliable measurement tools for culture that have been widely adopted in the surgical setting. The primary aims of this study were: 1) to test the reliability of a safety climate scale to assess group-level consensus or "climate" in the surgical setting, and 2) to provide useful benchmarking information on safety culture from 60 U.S. hospitals. Secondary objectives of this study were to examine differences in safety culture as a function of hospital and position (surgeon, anesthesiologist, certified registered nurse anesthetist [CRNA], OR nurse, and technician).

METHODS

The surgical survey instrument that we developed and used in the current study, the Safety Attitudes Questionnaire[9,10] was adapted from the Flight Management Attitudes Questionnaire (FMAQ)[11] and its predecessor, the Cockpit Management Attitudes Questionnaire (CMAQ).[12] The CMAQ is reliable, sensitive to change,[13] and elicited attitudes shown to predict performance.[5,14] We improved content validity of the SAQ by reviewing the literature on patient safety in the OR, asking OR healthcare provider types to review the survey, and by conducting focus groups.

The SAQ measures 6 domains: teamwork climate, safety climate, job satisfaction, perceptions of management, stress recognition, and working conditions. Seven of the 30 SAQ scale items map onto the safety climate domain. Safety climate assesses the perception of a strong proactive organizational commitment to safety, and our group has found that the elicited attitudes are associated with patient length of stay

and error rates in the ICU.[15] In this manuscript, we report the results of the safety climate domain in OR caregivers.

The SAQ (OR version) was administered to all OR caregivers in a Catholic health system comprised of 60 hospitals in 16 states in July and August of 2004. No provider type was excluded and OR caregivers included surgeons, anesthesiologists, CRNAs, OR nurses, and surgical technicians. Random sampling was not used due to small sample sizes in caregiver positions with a hospital, which would threaten the representativeness of the data. Instead, we sought as high a response rate as possible within each caregiver type within each hospital. Surveys were administered during preexisting departmental and staff meetings, together with a pencil and a sealable return envelope to maintain confidentiality. Individuals not captured in preexisting meetings were hand delivered a survey, pencil, and return envelope. No personal identifying information was tracked beyond job position and hospital.

We used multilevel confirmatory factor analysis[16] and reliability analyses to evaluate the reliability and preliminary validity of the 7-item safety climate scale. A basic criterion required to adequately assess culture or climate constructs is that individual perceptions show high agreement *within* units and high variance *between* units.[17] To examine the level at which perceptions of safety are shared, we first examined 2 units of analysis: professional culture (ie, by OR provider) and hospital culture (ie, by surgical unit). We tested for differences between OR providers and differences between hospitals with respect to each item using MANOVA, and globally using ANOVA. Then, to evaluate the extent to which perceptions of safety are shared within units and vary between units, we examined 2 versions of the intraclass correlation (ICC1 and ICC2) as well as the $r_{wg(j)}$ interrater agreement statistic.[18] Safety climate scale scores were computed by taking the average of the 7 items. One item was reverse scored with opposite wording valence to confirm accuracy. All statistical analyses were performed using SPSS version 12.0 (Chicago, IL) and MPLUS version 2.01.

RESULTS

There were 2769 eligible subjects (222 surgeons, 1058 OR nurses, 564 surgical technicians, 170 anesthesiologists, and 121 CRNAs) from the 60 hospitals. The overall response rate was 77.1% (2135 of 2769), with a range across hospitals of 57% to 100%. Table 1 shows respondent demographics and response rates.

TABLE 1. Respondent Demographics

Position	Response Rate (Returned/Administered)	Age (Yr) (Mean ± SD)	% Female (No.)	Years of Experience in Position (Mean ± SD)	Years Working at Current Hospital (Mean ± SD)
Surgeon	73% (222/305)	48.3 ± 9.92	8.6% (19)	17.4 (9.41)	12.3 ± 9.20
Surgical technician	78% (564/728)	37.8 ± 11.58	73.7% (417)	11.2 (11.17)	7.9 ± 9.45
Anesthesiologist	77% (170/220)	45.8 ± 9.31	12.7% (21)	15.8 (8.18)	10.6 ± 8.60
CRNA	67% (121/181)	44.6 ± 10.71	50.0% (63)	14.7 (12.32)	9.5 ± 9.35
OR nurse	79% (1058/1335)	43.3 ± 10.85	89.0% (942)	13.9 (10.04)	10.7 ± 8.69
Total	77% (2135/2769)	42.6 ± 11.3	68.5% (1462)	13.7 (10.47)	10.0 ± 9.08

TABLE 2. Safety Climate Scale Items and Descriptive Statistics for Benchmarking Safety Climate Data

Safety Climate Scale Item	Overall [Mean (SD); % Agree (Range)]	Surgeon [Mean (SD); % Agree (Range)]	Anesthesiologist [Mean (SD); % Agree (Range)]	Surgical Technician [Mean (SD); % Agree (Range)]	CRNA [Mean (SD); % Agree (Range)]	OR Nurse [Mean (SD); % Agree (Range)]
I am encouraged by my colleagues to report any patient safety concerns I may have	4.06 (1.025); 75.0 (33.3–100.0)	4.04 (0.899); 75.8 (40.0–100.0)	4.07 (1.050); 74.1 (20.0–100.0)	4.06 (0.950); 76.4 (28.6–100.0)	4.01 (0.967); 75.4 (40.0–100.0)	4.07 (1.053); 75.1 (40.0–100.0)
The culture in this clinical area makes it easy to learn from the mistakes of others	3.51 (1.132); 54.1 (25.0–100.0)	3.49 (1.114); 54.0 (20.0–100.0)	3.56 (1.118); 56.3 (8.3–100.0)	3.55 (1.162); 57.8 (0–100.0)	3.51 (1.046); 52.4 (20.0–73.3)	3.47 (1.148); 52.5 (13.3–100.0)
Medical errors are handled appropriately in this clinical area	4.04 (1.006); 71.6 (28.6–100.0)	4.27 (0.938); 78.9 (42.9–100.0)	4.03 (1.000); 71.9 (40.0–100.0)	4.15 (0.903); 78.8 (25.0–100.0)	3.99 (0.943); 72.3 (43.5–100.0)	3.98 (1.037); 68.8 (20.0–100.0)
I know the proper channels to direct questions regarding patient safety in this clinical area	4.20 (0.936); 81.4 (51.9–100.0)	4.20 (1.022); 79.6 (40.0–100.0)	4.17 (0.934); 79.8 (40.0–100.0)	4.07 (1.025); 75.3 (40.0–100.0)	4.04 (0.945); 77.6 (60.0–100.0)	4.26 (0.899); 83.9 (60.0–100.0)
I receive appropriate feedback about my performance	3.50 (1.207); 56.1 (25.0–100.0)	3.73 (1.065); 59.0 (20.0–100.0)	3.45 (1.277); 55.2 (15.0–100.0)	3.38 (1.014); 49.3 (20.0–80.0)	3.73 (1.075); 67.7 (34.8–100.0)	3.47 (1.227); 55.5 (18.8–100.0)
I would feel safe being treated here as a patient	4.28 (0.949); 81.3 (51.3–100.0)	4.59 (0.702); 92.6 (60.0–100.0)	4.23 (0.982); 80.1 (40.0–100.0)	4.45 (0.821); 86.3 (66.7–100.0)	4.35 (0.864); 84.0 (63.6–100.0)	4.22 (0.988); 78.4 (37.5–100.0)
In this clinical area, it is difficult to discuss mistakes (reverse scored)	3.24 (1.224); 44.6 (12.5–100.0)	3.32 (1.257); 46.3 (0–100.0)	3.14 (1.226); 41.7 (0–62.5)	3.34 (1.157); 49.6 (20.0–100.0)	3.22 (1.203); 41.8 (9.1–80.0)	3.26 (1.226); 45.2 (11.1–100.0)

Data are mean score on a 0 to 5 scale (5 = full agreement), SD, overall percent agreement, and minimum and maximum percent agreement.
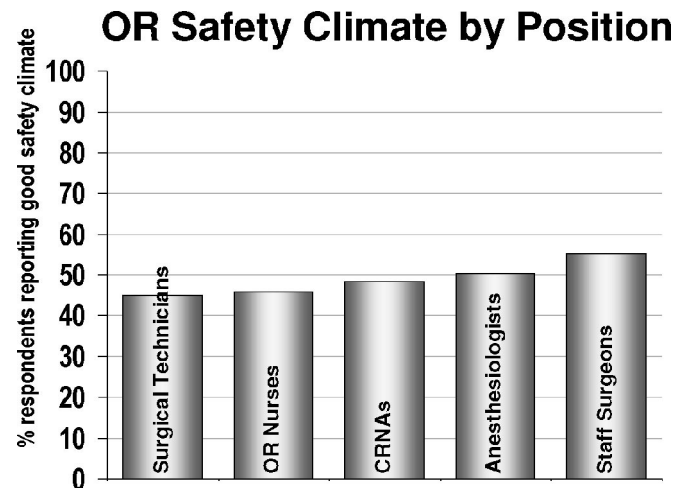

OR Safety Climate by Position

FIGURE 1. Safety climate by position.

Consistent with previous development work, confirmatory factor analysis replicated the 7 item safety climate scale with high face validity and internal consistency (overall $\alpha =$ 0.76; surgeon $\alpha =$ 0.75; surgical technician $\alpha =$ 0.74; anesthesiologist $\alpha =$ 0.74; CRNA $\alpha =$ 0.81; OR nurse $\alpha =$ 0.78). Response options for each item ranged from 1 (disagree strongly) to 5 (agree strongly). Table 2 displays the safety climate scale items and descriptive statistics for benchmarking safety climate data overall and by OR provider. The safety climate scale was robust and internally consistent overall and across positions.

Safety climate varied widely by hospital, but not position (Figs. 1, 2). MANOVA of the 7 items yielded 2 significant omnibus F results. An omnibus F for OR healthcare provider type of $F (28, 6059) = 2.19$, $P < 0.001$. Further analyses with Bonferroni adjustment specifically revealed that OR nurses were less positive about one item "I would feel safe being treated here as a patient" than surgeons and anesthesiologists. In other words, 6 of the 7 items did *not*
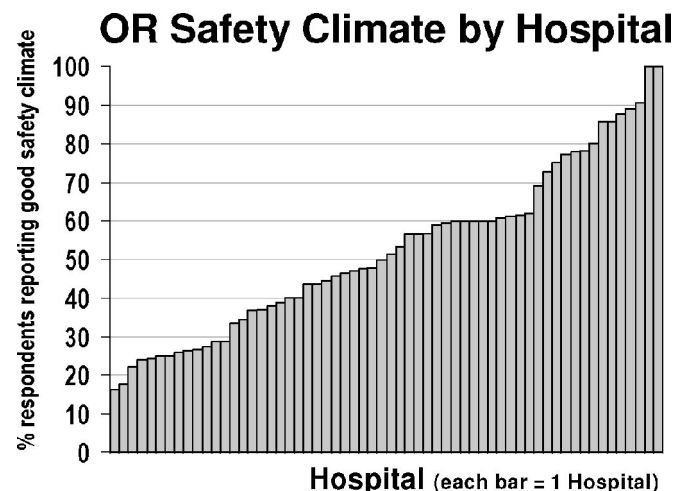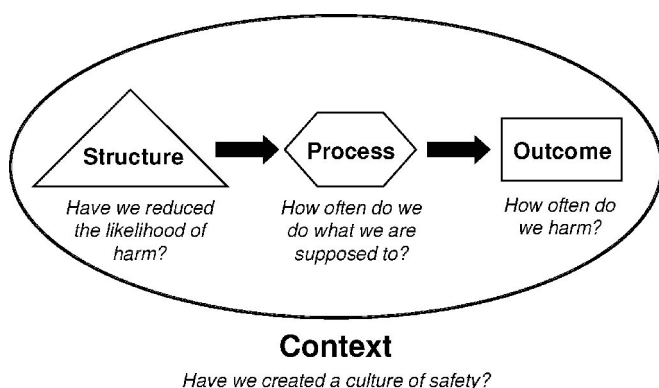

OR Safety Climate by Hospital

FIGURE 2. Safety climate by hospital (each bar represents one hospital).

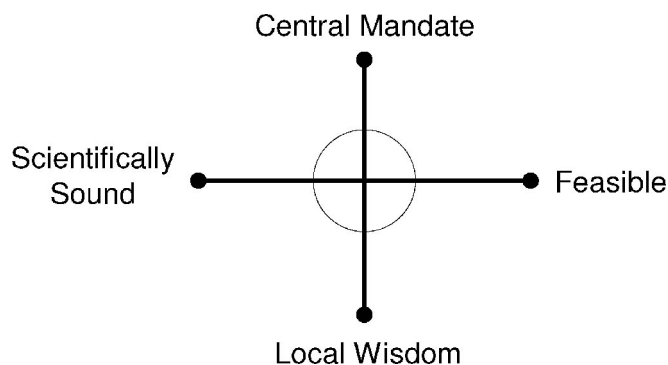FIGURE 3. Donabedian model for measuring quality. Type of measures: structure, process, outcome, or culture.

FIGURE 4. Finding the sweet spot: Issues in improving patient safety.

differ significantly by OR provider. An omnibus F for Hospital of $F(413, 11700) = 1.76$, $P < 0.001$, indicating that respondents perceive safety climate issues differently as a function of the hospital in which they work.

For the scale score analyses, ANOVA demonstrated no significant differences in safety climate scale scores between OR healthcare provider types, $F(4, 1910) = 1.64$, $P = 0.163$: surgeon (mean, 73.91), surgical technician (mean, 70.26), anesthesiologist (mean, 71.57), CRNA (mean, 71.03), and OR nurses (mean, 70.40). However, there were significant differences between hospitals ($F(59, 1910) = 3.85$, $P < 0.001$). Table 2 demonstrates the percent agreement (agree slightly and agree strongly) by position and by hospital. The percent of respondents reporting good safety climate in each hospital ranged from 16.3% to 100%.

DISCUSSION

The question "How do we know we are safer?" poses a challenge to many surgeons and institutions. The framework of understanding safety is Donabedian's model of categorizing measures as measures of structure, process, or outcome.[19] Structure is how we organize care, process is what we do, and outcomes are what we achieve (Fig. 3). The context of this system is the local culture, which affects each component in that it is how front-line personnel understand safety. In an attempt to analyze safety, many institutions and collaborative organizations focus on measures of structure (eg, presence of policies or committees). They may also measure processes (eg, how often evidence-based interventions are performed) and outcomes (eg, how often patient's are harmed). While these data can be useful in guiding system changes, measuring structure, processes, or outcomes in isolation may be misleading and ignores how engaged front-line personnel are in delivering safe patient care (Fig. 4). Creating a culture of safety is a paramount priority for many departments of surgery. While this goal is held high, measuring culture is rarely performed since the field of culture measurement in the healthcare setting has traditionally lacked good scientific methods.

The recent identification of safety culture as an important factor of a hospital system by JCAHO has spurred many hospitals to find a scientifically sound method to measure culture. We propose that OR safety culture can be measured using the safety climate scale of the SAQ. This psychometrically valid assessment provides benchmarks for departments of surgery and hospitals seeking to compare their safety climate to national means. In addition, it can serve as a baseline measure for evaluating any safety intervention. Unlike perceptions of teamwork climate, which differ as a function of role in the OR,[10] perceptions of safety climate are relatively consistent across OR providers in a given hospital. However, the marked variation in hospitals' safety climate scores, and the evidence that safety climate is sensitive to interventions,[15] suggests that existing strategies to promote patient safety at some centers may be effective. Identification and dissemination of these best practices could potentially benefit the surgical community at large. In effect, the survey elicits the input of the front-line personnel in surgery, recognizing that they have an important operational perspective on patient safety.

Limitations

The results reported here represent findings from 60 hospitals in one system. Organizations and researchers wishing to use this information for benchmarking purposes should be aware of 2 limitations. Although originally designed to be a baseline assessment, many of the hospitals had already implemented specific interventions aimed at improving patient safety. Consequently, even though the results identify significant opportunities for improvement, the overall distribution across the system may be higher than expected for a true baseline assessment. Another potential limitation relates to the remarkable response rates obtained (Table 1) that may be difficult for other organizations to obtain without methodologic rigor and support from senior leadership.

Teamwork

A rapidly growing industry of teamwork training programs has emerged to meet the growing demand to make operating room staff more aware of teamwork and communication as a means to improve patient safety. However, current teamwork training initiatives have not effected long-term attitudinal or behavioral changes. While these programs can be helpful, we have found that they are most effective in a peer-to-peer format, ie, surgeons teaching surgeons based

on their experience and existing data (Fig. 4). Changing a culture is difficult and is best accomplished through the use of "physician-champions" who serve as local role models and drivers of change. Empowering well-respected surgeons to promote principles of teamwork and communication can be the most effective means to advocate safe operating room practices.

OR Briefings and Debriefings

One strategy to improve patient safety in surgery adopted at the Johns Hopkins Hospital is the use of OR briefings and debriefings. These discussions, initiated and led by the surgeon, are intended to prevent and mitigate adverse events by promoting communication through improved teamwork. Specifically, they encourage any team member to speak up if they perceive a problem that could result in patient harm. The briefing consists of introductions by first name and role of each OR team member, a surgical time-out (or pause), and discussion of expectations for the operative plan, paying special attention to potential problems that could be encountered. We also conduct debriefings at the end of the case to note lessons learned for future patients and procedures. Preliminary evidence suggests that preoperative OR briefings are associated with an improved safety culture, reductions in wrong-site/wrong procedure surgeries, early reporting of equipment issues, and reduced operational costs.[20] Although briefings and debriefings are not end-all solutions to the problem of errors or inefficiencies in the operating room, they help to minimize errors by allowing personnel to discuss potential problems before they lead to a "near miss" or actual harm. Ultimately, what is needed is a combination of innovative surgical systems, a sustained focus on patient safety, improved communication, and excellent providers to reduce the risk of errors and enable surgical outcomes to achieve a six-sigma state.

Implications

Measurement is the foundation of quality improvement. In industry, tracking predictors of performance is vital to implementing new business strategies. In the hospital, culture scores may be the most sensitive tool available to measure safety risk in an operating room. Front-line providers have unique insights into the reliability and quality of any system. Indeed, executive interaction with front-line personnel is heralded as a marker of good leadership. Based on our findings, we submit that the SAQ may represent one approach for leaders in surgery to better understand the operating room, and, specifically, areas within a surgical department where the culture could be improved.

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Discussions

Dr. John B. Hanks (Charlottesville, Virginia): Dr. Makary and Dr. Freischlag and their group are to be congratulated on a nice analysis of a problem that is receiving increasing attention, a systems analysis of quality of patient care. They stress the important points that attitudes about the patient care setting, work environment and, by inference, job satisfaction, all play an important part in understanding the essentials of improved patient care.

This is an extremely difficult area to get past old habits and perceptions. To be really intelligent about this area, we

need quantitative data and tools, and this group has done an extremely well-defined approach. At UVA, we have used the time-out process specifically, and, given our experience with our recent JACHO review, this was received quite positively. So I suggest to membership that more than just a few of these things are very relevant.

I have a couple of questions for the authors.

As I understand the manuscript, the data are based on one mailing of the questionnaire. Do they have any experience with how the data might change on a second or third mailing? Would there be a Hawthorne effect? Do they feel that the experience of just going through the questionnaire itself might positively or perhaps negatively affect the answers later about a commitment to quality patient care?

As I interpret their questions, I see that there are really two types that are very interesting. One set of questions would relate to job satisfaction. The second obviously deals with issues of the quality, of which the most important question is, would I feel safe being operated on in this hospital?

Did the authors look at a stratification of job satisfaction and compare those levels against perceptions about quality of care? Neophytes in this area, such as myself, always worry about whether or not the less satisfied members of the team have colored their answers about quality of care.

DR. MARTIN A. MAKARY (BALTIMORE, MARYLAND): Certainly the Hawthorne effect was present. It is intrinsic to all surveys. It is essentially a bias that participants have to overrepresent how well they are doing because they know they are being evaluated. In fact, I think that speaks even more to your excellent point that this survey needs to be given in sequence so that changes in culture are seen as sustainable.

Training events and safety programs which are measured by instant questionnaires at the conclusion of the program or the training session are, in my opinion, meaningless and not worth our time. Culture change has to be significant, especially since changes in culture appear to be related to the outcome measures that we have looked at as defined by AHRQ, namely, rates of surgical site infections, rates of postoperative hemorrhage and hematoma requiring a second operation, and rates of pulmonary embolism and DVT, as you saw on the slide.

The study design, of course, is not perfect. But it is feasible. And in balancing what is scientifically sound versus what is feasible, we think that a simple set of questions, namely, asking personnel whether or not they feel comfortable being operated upon in the operating rooms in which they work, is probably one of the best ways to not only fulfill the JCAHO requirement but provide a cheap and accurate means of risk assessment, which is internal and is developed by surgeons. This is a question that we came up with as a group of surgeons in conjunction with Brian Sexton, who is a social psychologist who actually worked for Continental Airlines looking at the same question. So it is minimally invasive.

I appreciate your comment, Dr. Hanks, that culture is very fluid. In fact, I think that is why all these hospitals are in fact interested in measuring their culture on an annual basis.

Job satisfaction has actually been an interesting domain. We added questions using the Moslatch scale. Dr. Moslatch was a social psychologist at the University of Michigan whose career was based on the science of burnout. And we added questions so that we could derive an index score based on her understanding of burnout from measuring it in numerous disciplines, not just medicine. And in fact, there was an association between job satisfaction burnout and safety climate, although when adjusted for job satisfaction, burnout, there were still significant differences in safety climate. So your point, I think, is a valid one. And whether or not there is a cause and effect, I think perhaps is best determined locally, or future research may show the Association.

The purpose of this study was really to provide a simple and scientifically valid and reliable tool to measure culture in some form. The alternative, of course, from the psychometric standpoint, would be to have independent observers come into the operating room and watch behavior. In fact, we do have a study at Kaiser looking at 350 operations where two social psychologists are observing how often surgeons engage in a conflict and how those conflicts are resolved. And they look at specific features of team dynamics all the way down to whether or not we know the names of the people we work with. This simple and well-validated questionnaire, I would submit is a much cheaper and better approach to measuring culture, and in fact will fulfill the JACHO requirement that is pending for 2007.

Like NSQIP, this is essentially a response that we, I think, as surgeons have an opportunity to develop as a group without collaborative organizations and groups of non-surgeons telling us how we need to do this. And I think it is perhaps one effective way to measure culture.

DR. THOMAS R. RUSSELL (CHICAGO, ILLINOIS): I can tell you that, at the American College of Surgeons, we are taking very seriously the issue of not only safety, which focuses on adverse events or mistakes that happen in hospitals, but also quality improvement, which attempts to set up processes of care in our hospitals so that these mistakes never happen.

You alluded to the Joint Commission on Accreditation of Healthcare Organizations (JCAHO). The JCAHO is really attempting to transform itself into an organization that is not just an accrediting body or a disciplinary body, but rather an institution that is coming into our hospitals with concrete efforts to improve processes of care. The universal protocol that dealt with correct site and patient surgery was established a few years ago with the American College of Surgeons and other interested stakeholders. You are going to see an increased number of core safety measures in quality improvement that will be emanating from the JCAHO.

I commend Johns Hopkins for doing this study. You are leading an effort in safety with appropriate alignment between the medical staff and the administration of the hospital. This is absolutely going to be key to have a lead organization such as Johns Hopkins take charge in trying to bring a strong culture of safety into the fabric of our hospitals.

I would like to ask the question to whether you are extending this type of survey into other components at Johns Hopkins? Are you taking it from the operating rooms and dealing with other aspects of health care within the hospital?

DR. MARTIN A. MAKARY (BALTIMORE, MARYLAND): We have modified the SAQ to the intensive care unit. That is the first domain that we have expanded to. We have also now a version for the emergency department and labor and delivery area and in fact, every clinical area, so that an institution can measure their culture hospital-wide.

I think it is important, as you mentioned, that the local wisdom be accounted for in assessing culture. There is a constant tension and sort of quality measurement universe of central mandates versus local wisdom, and we have been propagating very strongly for local wisdom to be a part of every metric that is being developed within surgery.

Essentially, this is consistent with any management strategy, that is to account for the perspectives of front-line workers in measuring the level of safety or quality in any process. So I very much appreciate your comments.

DR. JOSEPH B. COFER (CHATTANOOGA, TENNESSEE): I have been doing something a little bit different at my place. For about 6 months now, I have been using a "pre-flight" checklist, based on my time in the Navy, where before surgery I have a "pre-flight" brief in the holding area between anesthesia, surgery, and the nurses. There is a form that is filled out. We do the case, we have a time out. Then afterwards we have a 360 evaluation wherein nurse, anesthesia, and surgery all evaluate each other.

I have found that for me it has worked great, especially in getting preference cards read, blood always ready, antibiotics always given, etc. The nurses really love it. They really think it is great. But I cannot get anesthesia on board. It is almost like they are offended that you would want to meet with them in the holding area and discuss anesthesia or discuss how the case is going to be done or discuss vascular access.

Have you had that problem? The nurses love it. The patients seem to like it. They see what is going on. They are awake, you are at the foot.

DR. MARTIN A. MAKARY (BALTIMORE, MARYLAND): We have had every problem you can conceive of, including that problem. Certainly, changing a culture takes time. And I applaud you for your effort. Certainly, the briefing as we outlined is not perfect, and that will be the first or second of

many renditions that will develop through the years as we figure out what works best both for surgery and within our own hospitals.

I have also noticed that the patients love it when we discuss their concerns, if they have a concern about their airway or they want to make sure they are going to receive local anesthetic or if they are not going to receive blood products or that they have a certain allergy. When they hear the discussion going on or know that it is going to go on before their operation, they are almost sometimes shocked that this hasn't been going on for years as a routine sort of conversation among groups. So I think what you are doing is excellent. In fact, I think we will all learn together.

In the distribution of safety climates that we saw among the 60 hospitals, what we have done is take individuals like yourself that have had some success and some frustrations and share those experiences with the hospitals that have a low safety climate. And from dialogues like this perhaps we can all learn from each other.

DR. AARON S. FINK (ATLANTA, GEORGIA): In the VA, many of these things are mandated at a national level. We had the good fortune of being visited by the National Patient Safety Center, which has avidly promoted both actions, particularly the preoperative briefings that you have instituted. We had a lot of trouble with "buy-in" for preoperative briefings, as many considered this to be an exaggerated time-out; thus, we focused our efforts on developing a debriefing, as you have.

We found that the debriefing has been better accepted by many of our staff in the operating room. In addition, it has provided an opportunity to focus discussion between the attendings and the residents regarding to the four measures of the SCIP program being recommended by CMS. Thus, we have now formalized a discussion about whether antibiotics will be used in a prophylactic manner and, if so, which ones and when they will be discontinued; thromboembolic prophylaxis if the patient has a cardiac situation; whether beta blockers have been started and will be continued; and obviously for patients on the ventilator, what measures will be instituted in addressing ventilator-associated pneumonia. We have found this approach to be very helpful.

DR. C. DANIEL SMITH (ATLANTA, GEORGIA): I don't want to sound like a skeptic because I think this time-out would be incredibly valuable. However, in the course of my operative day, I am the only consistent member of my team from beginning to end. There will be no less than 10 team changes: anesthesia, nurses. Maybe you could give some practical recommendations on how you deal with this team migration and change that takes place. Actually, by the end of a case, my team has changed, so the debrief at the end won't consist of the same team members we started with. How do you deal with this during the course of an operative day in a busy

practice where you will have residents not even finish the day with me in the operating room?

DR. MARTIN A. MAKARY (BALTIMORE, MARYLAND): That is an excellent point. We as attending surgeons often find ourselves the only non-shift workers in the operating room sometimes. And it is a difficult problem, to be very frank. We have tried to do some things such as make it a rule that nurses need to change their name on the board of the operating room when they come in, and we are trying to minimize the number of silent switch-outs, so that people just feel encouraged to say, "I'm here now taking over for so-and-so, and what's going on?"

The idea is to encourage approachability and to get people to speak up if they see that the blood type is not right for the heart that is being transplanted or some major catastrophe. If they feel that antibiotics should have been administered to a patient but somebody may have forgotten, we want to encourage people to speak up and say something. Certainly, a briefing, a checklist covering antibiotics, DVT prophylaxis, is not going to cover everything and it is not perfect. But it is some discussion that we can have with our colleagues.

This field of patient safety has been really plagued with bad science for many years. And the only science that we have is really from industry and from aviation. I have found that surgeons sometimes resent being compared to pilots because things are not so well measured in the operating room. Perhaps with anesthesia, that may be different. Anesthesiologists feel that giving anesthesia is very much like flying a plane, that they use a lot of the same lingo. But in surgery, there are many more variables that are difficult to measure.

The idea of talking about the lack of antibiotic prophylaxis, the high rates of DVTs, comparing your performance within a collaborative, and using data such as data from small studies of briefings may be one attempt to apply some science to a field that really has had very little science to an audience which really speaks the language of science. And we have found that in achieving buy-in, which is a very difficult problem, identifying physician champions can be the best means of doing that.